Appendix 8-E
Rationale for Draft Guidance on Buffers and Other Protection for Wetlands

The guidance for protecting the functions and values of wetlands is based on the review of the scientific literature presented in Volume 1. The information provided here is structured to link with the measures recommended for protecting and managing wetlands using the *Washington State Wetlands Rating System*, presented in Appendices 8-C and 8-D.

The information is also organized by function and by the type of wetland rather than by wetland category to avoid repeating the same information. For example, a wetland rated as a Category I wetland with excellent habitat functions needs the same buffer as a wetland rated Category II if their scores for habitat in the rating system are the same. The buffers required to protect habitat are usually larger than those needed to protect other functions such as water quality improvement. The hydrologic functions of flood storage, groundwater recharge, and reducing erosion are not significantly influenced by the width of the buffer. These functions need to be protected at the scale of the watershed or sub-basin in which the wetland is found.

Wetlands that function well as habitat for wildlife
(29 - 36 pts. on the questions for habitat functions in the rating system)

Buffers:

In eastern Washington: 200 feet for land uses with high impacts; 150 feet for moderate impacts; 100 feet for low impacts

In western Washington: 300 feet for land uses with high impacts, 225 feet for moderate impacts; 150 feet for low impacts

Wetlands with a high score for their habitat functions (29 - 36 points) have both the physical structures (vegetation, open water, etc.) and the connections to other natural habitats that are necessary for a wide range of species, including birds, mammals and amphibians. This means that the wetland is very likely to be providing habitat for one or more species that needs a larger buffer. In the absence of direct evidence to the contrary, it is necessary to assume that wildlife that requires a large buffer is using the wetland. The review of the literature presented in Chapter 5 of Volume 1 indicates that buffers necessary to protect wildlife habitat functions of wetlands range from 100 to 600 feet or more (Sheldon et al. 2003). Most authors who have synthesized the buffer literature with respect to wildlife habitat recommend buffers of 200 to 300 feet for wetlands with

high habitat functions. One synthesis recommended a buffer of 200 feet as adequate to protect most species found in wetlands in eastern Washington and 300 feet in western Washington adjacent to high-intensity land uses (Castelle et al. 1992). This difference between eastern and western Washington was based on literature that showed that wildlife species tend to concentrate more around wetlands and streams in arid climates. The specific buffer widths proposed for the different types of land uses falls within the recommendations based on a review of the scientific literature (Volume 1, Chapter 5).

Thirteen of the 90 wetlands in eastern Washington (14%) used to calibrate the rating system had scores of 29 or higher for the habitat functions. These were judged to provide the best habitat potential and would require a buffer of 200 feet. Thirteen of the 122 wetlands in western Washington (11%) had scores of 29 or greater and would require a 300-foot buffer.

NOTE: A 200-foot or 300-foot buffer alone will not protect the habitat functions of a wetland with a high score for habitat. The connectivity to other natural areas needs to be maintained (see below).

Other protection needed to maintain habitat functions: Maintaining connectivity to other natural areas

Wetlands with a high score for their habitat functions have the connections to other natural habitats that are necessary for a wide range of species. The scientific information summarized in Chapter 3 of Volume 1 points out that fragmentation and the disruption of the vegetated corridors between undeveloped areas are a major cause of the loss of species richness (biodiversity). Existing connections and corridors need to be protected. This can be accomplished by regulating the type and nature of road crossings in the corridor and by limiting changes in land use in the corridor. Such protection is best accomplished as part of a regional planning effort that identifies critical habitat corridors and protects the natural mosaic of different ecosystems.

Wetlands that have a moderate level of habitat functions

(20 - 28 pts. on the questions for habitat functions in the rating system)

Buffers:

<u>In both eastern and western Washington</u>: 150 feet for land uses with high impacts; 110 feet for moderate impacts; 75 feet for low impacts

Wetlands with a moderate score for their habitat functions (20 - 28 points out of 36) have some of the physical structures (vegetation, open water, etc.) and some connections to other natural habitats that are necessary for a wide range of species. This means that the wetland is less likely to be providing habitat for species that need the largest buffers. On

the other hand, wetlands that score in this range do provide habitat for a wide variety of species, some of which, such as waterfowl, still need a relatively large buffer to protect them from disturbance.

Wetlands that function well to improve water quality

(24 – 32 points on the questions relating to water quality improvement in the rating system)

Buffers:

In both eastern and western Washington: 100 feet for land uses with high impacts; 75 feet for moderate impacts; 50 feet for low impacts

The functions of water quality improvement within a wetland can be degraded if excess pollutants (sediments, nutrients, toxic materials) enter the wetland. Buffers of 100 feet are recommended for wetlands that are currently performing these functions well to prevent any further degradation. Reviews of existing data indicate that a buffer of 30 m (approximately 100 feet) will remove 70% or more of the sediment and pollutants from surface runoff before they reach the wetland (Desbonnet et al. 1994).

Other protection needed to maintain functions that improve water quality: No additional surface discharges of untreated runoff

Buffers will not adequately protect the water quality improvement functions if polluted waters bypass the buffer and enter the wetland via pipes, ditches, or other channels. To protect these functions it is necessary to limit the introduction of any additional pollutants from new development or other activities that might enter the wetland through untreated runoff that bypasses the buffer.

Natural Heritage Wetlands

Buffers:

In both eastern and western Washington: 250 feet for land uses with high impacts; 190 feet for moderate impacts; 125 feet for low impacts

Natural Heritage wetlands contain rare plants or those that are particularly sensitive to disturbance. These types of species are very sensitive to nutrient enrichment (eutrophication) that results from the input of nutrient-rich waters (see Chapter 4 of Volume 1). The buffer needs to remove excess nutrients before they reach the wetland. The most efficient vegetated buffer, based on width-to-removal ratios, is about 60 m (197 feet) for removal of nitrogen and 75 m (253 feet) for phosphorus (Desbonnet et al.

1994). A buffer of 250 feet is, therefore, recommended for Natural Heritage wetlands that could be affected by land uses that have high impacts.

NOTE: A 250-foot buffer alone may not protect the rare or sensitive plants in the wetland if the watershed has high nutrient loadings or a water regime that is unstable. These factors may allow invasive plant species to come into a wetland and overwhelm the rare species.

Other protection needed for Natural Heritage Wetlands: No additional surface discharges to wetland or its tributaries

Buffers will not adequately protect the rare plants in a wetland if polluted waters bypass the buffer and enter the wetland via pipes, ditches, or other channels. To protect the plants it is necessary to limit the introduction of additional nutrients that might bypass the buffer and enter the wetland through untreated runoff from new development or changes in land use. Furthermore, discharges of stormwater and changes in the water regime from development will change the wetland plant communities (see Chapter 4 of Volume 1). Such changes might impact the populations of the rare species in the wetland.

Other protection needed for Natural Heritage Wetlands: No septic systems within 300 feet of wetland

Septic systems do not prevent nitrates, a major plant nutrient, in wastewater from entering groundwater. Many wetlands in Washington have at least some of their water, if not all, coming from groundwater. This means that nutrients released by septic systems can enter a wetland and impact rare or sensitive species in the same way as surface water. By keeping septic systems at least 300 feet from the wetland edge there is a better chance that impacts from nutrients will be minimized. There is no "safe" setback for septic systems if there is a direct groundwater connection (underground flow) between the septic system and the wetland. A 300-foot setback, however, will increase the chance that the nitrogen will be diluted before it reaches the wetland.

Bogs

Buffers:

<u>In both eastern and western Washington</u>: 250 feet for land uses with high impacts; 190 feet for moderate impacts; 125 feet for low impacts

Bogs are particularly sensitive to nutrient enrichment (eutrophication) that results from the input of nutrient-rich waters. The buffer needs to remove excess nutrients before they reach the wetland. The most efficient vegetated buffer, based on width-to-removal ratios, is about 60 m (197 feet) for removal of nitrogen and 75 m (253 feet) for phosphorus (Desbonnet et al. 1994).

NOTE: A 250-foot buffer alone may not protect the rare or sensitive plants in the bog if the watershed has high nutrient loadings, and the nutrients are transported into the bog in a stream.

Other protection needed for bogs: No surface discharges to wetland

Buffers will not adequately protect the functions of a bog if polluted waters bypass the buffer and enter the wetland via pipes, ditches, or other channels. To protect the bog, it is necessary to limit the introduction of additional nutrients that might come in through untreated runoff that bypasses the buffer.

Forested Wetlands

Buffers:

Buffer size for forested wetlands is to be based on the score for habitat functions or water quality functions.

Forested wetlands are given special consideration because they are difficult to replace through compensatory mitigation. The protection they need should be based on the functions they provide. Buffers and other measures to protect the functions, therefore, should be determined by how well the wetland scores for habitat or water quality functions.

Other protection needed for forested wetlands: Protect water regime in watershed

If the wetland is a riparian forest, it needs protection at a watershed scale. Buffers alone will not protect riparian forest wetlands because they are directly connected to the water flow and dynamics in the watershed. Changes in the water regime of the watershed that result from changes in land use have a significant impact on riparian wetlands.

Alkali Wetlands

Buffers:

In eastern Washington: 200 feet for land uses with high impacts; 150 feet for moderate impacts; 100 feet for low impacts

The ecological process that maintains an alkali wetland is the dynamic between water inflow and evaporation. Buffers have little impact on maintaining this process. The 200-foot buffer recommended for alkali wetlands is based on their habitat functions. Alkali wetlands in eastern Washington are a major resource for migratory shorebirds and

other water-dependent birds. The 200-foot buffer recommended is to protect these birds, and minimize disturbance, during their migrations and feeding (see Chapter 5 in Volume 1).

Other protection needed for alkali wetlands: No additional surface discharges

The routing of additional surface water to alkali wetlands will change the balance between inflow and evaporation because the incoming water will usually be less salty than that in the wetland itself. No information was found, however, on the impacts this may have on the ecosystem in the alkali wetland. There is a significant risk, therefore, that the ecosystem may be impacted if discharges are allowed into alkali wetlands. The recommendation is that no surface discharges (stormwater, irrigation, etc.) be allowed.

Vernal Pools (Category II)

Buffers:

Vernal pools that are currently relatively undisturbed are very important for migratory waterfowl during a short period in the early spring. The review of the literature indicated that waterfowl need at least 200 feet of buffer during that short period to protect them from disturbance. The rest of the time the vernal pools provide little habitat for larger animals that require larger buffers.

Wetlands in Estuaries and Coastal Lagoons

Wetlands in estuaries and coastal lagoons are part of the marine ecosystem. As a result, information about them was not included in the review of the literature in Volume 1. It is not possible to make recommendations that reflect an extensive review of the current scientific information at this time.

The buffers recommended in Tables 6 and 7 of Appendix 8-C for estuarine wetlands and coastal lagoons in western Washington are based on generally accepted habitat functions. Coastal wetlands are a major resource for migratory shorebirds and other water-dependent birds (Simenstad 1983). The widths of buffers recommended are to protect these birds, and minimize disturbance, during their migrations and feeding (see Chapter 5 in Volume 1 for a discussion of buffers generally needed to protect birds).

Interdunal Wetlands

Wetlands in coastal dune systems of Washington are part of the coastal marine ecosystem. As a result, information about them was not included in the review of the

literature in Volume 1. It is not possible to make recommendations that reflect an extensive review of the current scientific information at this time.

The buffers recommended in Table 6 of Appendix 8-C for interdunal wetlands in western Washington are based on generally accepted habitat functions. These wetlands are considered to be a major resource for migratory shorebirds (Wiedemann 1984). The buffers recommended are to protect these birds (see Chapter 5 in Volume 1 for a discussion of buffers generally needed to protect birds).

References

Castelle, A.J., C. Conolly, M. Emers, E.D. Metz, S. Meyer, M. Witter, S. Mauermann, M. Bentley, D. Sheldon, and D. Dole. 1992. *Wetland Mitigation Replacement Ratios: Defining Equivalency.* Publication No. 92-08. Olympia, WA: Washington Department of Ecology.

Desbonnet, A., P. Pogue, V. Lee, and N. Wolff. 1994. *Vegetated Buffers in the Coastal Zone: A Summary Review and Bibliography.*

Sheldon, D., T. Hruby, P. Johnson, K. Harper, A. McMillan, S. Stanley, E. Stockdale. August 2003. *Freshwater Wetlands in Washington State, Volume 1: A Synthesis of the Science (Draft).* Washington State Department of Ecology. Publication No. 03-06-016.

Simenstad, C.A. 1983. *The Ecology of Estuarine Channels of the Pacific Northwest coast: A Community Profile.* U.S. Fish and Wildlife Service FWS/OBS-83/05.

Wiedemann, A.M. 1984. *The Ecology of Pacific Northwest Coastal Sand Dunes: A Community Profile.* U.S. Fish and Wildlife Service FWS/OBS-84/04.